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DESCRIPTION OF A NEW SUBSPECIES OF CYMATIUM (GASTROPODA, RANELLIDAE) FROM THE ATLANTIC OCEAN.

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RESUMEN

Se describe *Cymatium (Monoplex) comptum amphiatlanticum* n. ssp, para el Océano Atlántico. Comparándola con especies similares de su grupo taxonómico como *C. comptum* (Adams, 1855), *C. indomelanicum* García-Talavera, 1997 y *C. vespaceum* (Lamarck, 1822), se descubrieron caracteres morfológicos distintivos, pudiendo realizarse una diagnosis diferencial. En principio, *C. comptum amphiatlanticum* parece ser similar a *C. comptum*, pero tras un estudio exhaustivo de la concha, se aprecian diferencias bien definidas. Todo ello sugiere que la forma atlántica de *C. comptum* puede ser considerada, al menos, una nueva subespecie. Pensamos que ambas tuvieron un ancestro común procedente del Océano Pacífico.

Palabras Clave: Gastropoda, Ranellidae, *Cymatium comptum amphiatlanticum*, nueva subespecie, Océano Atlántico.

ABSTRACT

Cymatium (Monoplex) comptum amphiatlanticum n. ssp. is described in the present work, from the Atlantic ocean. Comparing it with similar species of its taxonomic group as *C. comptum* (Adams, 1855), *C. indomelanicum* García-Talavera, 1997 and *C. vespaceum* (Lamarck, 1822), distinctive morphological characters of the protoconch and teleoconch were revealed. By doing this, a differential diagnosis was possible. In a first approach, *C. comptum amphiatlanticum* seems to be very close to *C. comptum*, but conspicuous differences between them are visible after an exhaustive study of the shell. This suggest that the atlantic form of *C. comptum* can be considered, at least, a new subspecies. We understand that both had a common ancestor from the Pacific ocean.

Key Words: Gastropoda, Ranellidae, *Cymatium comptum amphiatlanticum*, new subspecies, Atlantic ocean.

1. INTRODUCTION

The *Ranellidae* family is well known in the malacological studies for its special genetic and biogeographical characteristics, making it a very interesting family of Gastropods. In a previous work, on having described *Cymatium indomelanicum* (The Conchiglia, 1997, nº 284) we stressed the importance of studying in depth some *Ranellidae* species, in order to clear current controversy about them. In this publication we already explained that the species from the Atlantic Ocean, present in the Canary Island, known at first as *C. gemmatum* (Clench and Turner, 1957), later as *C. vespaceum* and in the last years as *C. comptum*, needed a review, since we were estimating notable differences. We confirm these differences in this work and conclude that the Atlantic form of *C. comptum* is a new subspecies, that we named *Cymatium comptum amphiatlanticum* n. ssp.

This new subspecies clearly belong to the "C. vespaceum Complex" (BEU [2]). This complex includes species as *C. comptum*, *C. vespaceum*, *C. indomelanicum* and *C. penniketi*, due to the numerous characteristics that they share. Even so, the new described subspecies possess a series of morphologic characters that differentiates it clearly from *C. comptum*, the original species of this complex with which it can be misidentified.

2. DESCRIPTION

2.1. Shell description.

***Cymatium (Monoplex) comptum amphiatlanticum* n. ssp.**

Shell of small size (19.15 mm of mean), greatly fusiform, with a low spire, and a less marked or defined whorls in the global context of the shell. This causes a not very defined nodules. Teleoconch with 3.5 - 4 whorls, the last one occupying 3/4 from the whole. Cream colour (though some specimens may presents orange tonalities, and others are albinos or melanist, with the peribasal band whitish), with darker dun lines in the varices, which disappear in the rest of the teleoconch. Generally presents only one varix placed in the last whorl, thin and wide, approximately 240º before the external lip. Relatively short and straight siphonal channel, lightly curved in its terminal part. Small, white, narrow and elliptical aperture, with columelars folds from the interior of the aperture up to the external margin, and seven pairs of denticles. Thin parietal and columelar calluses, with a well developed fold in the posterior zone. Smooth, low, wide and robust protoconch, of yellow - dun clear and dull colour. Ornamentation consisting of a principal spiral cord moderately width, and a thinner secondary spiral cord between every principal one. Thin and definite axial cords that cause a few granulations in its intersection with the spiral cords. Although being enough small in size, they are very marked and well defined, especially in the principal spiral cords. Smooth and brilliant periostracum, presenting relatively shorts and thin hairinesses with axial disposition, in protuberances, varix and external lip. Oval operculum with apical growth.

We also think that is necessary to leave witness of the appearance of some specimens of melanistic forms of *C. comptum amphiatlanticum*. The shell presents a very dark brown color, excepting a whitish part which comprehends varix, external lip and the peribasal

band. This pattern of coloration is alike the typical one which has *C. indomelanicum*, which can lead a misidentification with this species. In any case, detailed observations confirm that these melanistic specimens belong to *C. comptum amphiatlanticum*, since, apart from the pattern of coloration, they do not present practically any morphologic difference with the original form.

So far, this melanistic form has only been found in the Western coast of the Atlantic Ocean, concretly in Cuba, and also its presence has been confirmed in Brazil (DOS SANTOS, RAMOS & LEAL [6]). Nonetheless, we do not discard that this form can have an amphiatlantic distribution, due to its location in the system of streams circulation of the above mentioned ocean (GARCÍA - TALAVERA [9]).

2.2. Distribution

In the Western Atlantic, through the Caribbean coast, in Florida (CLENCH & TURNER, [4]), Cuba, Venezuela and Brazil (DOS SANTOS, RAMOS & LEAL [6]; RIOS [14]), where the Holotype and Paratypes were dredged, and in the Eastern Atlantic, at the Cape Verde Islands (SAUNDERS [15]) and the Canary Islands (GARCÍA - TALAVERA [8]).

2.3. Type Material

Holotype (Fig. 1) from Pompano Beach, Florida, **Paratypes 1, 2, 3, 4** from Cienfuegos, Cuba; **Paratypes 5, 6, 7** from Ensenada de Maya, Cuba; **Paratype 8** from Los Roques, Venezuela; **Paratype 9** from La Habana, Cuba; and **Paratype 10** from Port Luis, I. Guadalupe (Fig. 3).

Holotype and Paratypes 1, 3, 4, 5, 6, 8, 9, 10 are deposited at the Type Collection of Marine Mollusca of Museo de la Naturaleza y el Hombre (MNH), Tenerife, Canary Islands. **Paratype 2** will be deposited at British Museum of Natural History (BMNH), and **Paratype 7** at the New Zealand Geological Survey (NZGS).

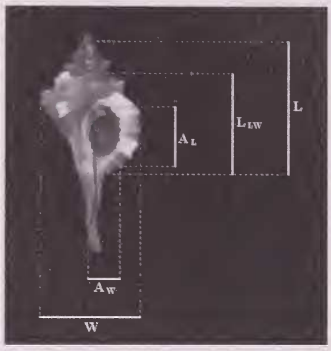
2.4. Etymology

We named *amphiatlanticum*, the new subspecies for the Atlantic ocean, for being one of the *Ranellidae* species which lives in the two margins (oriental and occidental) of this ocean.

3. MORFOMETRY AND COMPARED STATISTICS

Trying to establish the morphological differences between every species, the shell dimensions of a whole of 31 specimens of the MNH collection were analyzed, of which 18 correspond to the typical form of *C. comptum*, and 13 of *C. comptum amphiatlanticum* form.

To make this dimensions comparable, they were calculated measuring only the teleoconch, without including the protoconch and the siphonal channel. This was done due to the possible absence for the total or partial loss of these elements in some of the analyzed specimens. Taking this pattern of measurement, the possible influence and the consequent mis-



take that would cause these specimens in the analysis is eliminated, due to the difference of lengths for extrinsic reasons of these elements excluded from the analysis.

The set of measurements estimated for every specimen of each one of the two species is as follows:

- **Teleoconch Length (L).**
- **Teleoconch Wide (W).**
- **Last Whorl Length (L_{LW}).**
- **Aperture Length (A_L).**
- **Aperture Wide (A_W).**

3.1. Dimensions (in mm)

Cymatium comptum (Adams, 1855)

Locality	L	W	L_{LW}	A_L	A_W
Calitoban Isl., PHILIPPINES	27	18	19	10	5
Calitoban Isl., PHILIPPINES	21	15	16	9.5	5
Calitoban Isl., PHILIPPINES	19	13.5	14	7	4
Mactan Isl., Cebu, PHILIPPINES	25.5	16.5	17	10	5.5
Mactan Isl., Cebu, PHILIPPINES	23.5	17	18	10	5.5
Mactan Isl., Cebu, PHILIPPINES	23	16	16	10	5.5
Mactan Isl., Cebu, PHILIPPINES	24.5	15	17	9.5	5
Mactan Isl., Cebu, PHILIPPINES	22	15	15.5	9	5
Mactan Isl., Cebu, PHILIPPINES	18	12.5	13.5	8	4.5
Mactan Isl., Cebu, PHILIPPINES	17.5	13	13.5	7.5	4
Mactan Isl., Cebu, PHILIPPINES	20	14.5	14.5	9	5
Phuket, THAILAND	23	15	16.5	9.5	5.5
Minake, JAPAN	23.5	14.5	17	9.5	5
Bohol, Cebu, PHILIPPINES	23.5	16	16.5	10	5.5
Bohol, Cebu, PHILIPPINES	21	14	14.5	8	4.5
CENTRAL PHILIPPINES	20	13	14.5	9	5
CENTRAL PHILIPPINES	18	13	13.5	9	5
VIETNAM	22.5	16	16	8.5	5
MEAN	**21.81**	**14.86**	**15.69**	**9.06**	**4.97**

Cymatium comptum amphiatlanticum n. ssp.

Specimen	L_T	L	W	L_{LW}	A_L	A_W
Holotype	20	15.5	11.5	12	7	3.5
Paratype 1	17	11	8	9	5.5	2.5
Paratype 2	20	15	10	11.5	6	3
Paratype 3	17	13	8.5	10.5	5.5	2.5
Paratype 4	16.5	13	9	10	6	2.5
Paratype 5	18	13.5	9	10.5	5	2.5
Paratype 6	22	17.5	12	13.5	8	3.5
Paratype 7	20.5	16.5	11	12	6	3
Paratype 8	19.5	15	11	11.5	8	4
Paratype 9	17	13.5	9.5	10.5	6.5	3
Paratype 10	18.5	15	10	11.5	6	3
1251 / Boca Ratón, FLORIDA	18	22.5	15.5	16.5	10	5
1260 / Ensenada de Maya, CUBA	25	17.5	11.5	13.5	7.5	3.5
MEAN	**19.15**	**15.27**	**10.5**	**11.73**	**6.69**	**3.19**

To solve the difficulty of making these dimensions (considered as principals) comparable, due to the size differences between both species to be analysed, a series of Secondary or Relative Dimensions was calculated, from these, which make the comparisons possible. They are the confirmed ones in the posterior statistical study:

- **Relative Last Whorl Length (L_{LW} / L)**
- **Relative Teleoconch Wide (W / L)**
- **Aperture Widening (A_W / A_L)**
- **Aperture Size ($\sqrt{A_W \times A_L}$/ L)**

Obtained Means for each species are:

SPECIES	L_{LW} / L	W / L	A_W / A_L	$\sqrt{A_W \times A_L}$/ L
C. comptum	0.7219	0.68	0.5499	0.3095
C. comptum amphiatlanticum	0.7714	0.6885	0.4762	0.3017

3.2. Statistical Analysis

Using the dimensions of the specimens detailed, a parametric statistical study was carried out, based on a Student's-t Test distribution with a 95% of significance. This was done to contrast whether significant differences exist in the relative dimensions, and therefore in the detailed morphology of the shell between each of the two species to analyse. In spite of possessing few specimens to carry out a totally irrefutable analysis, we think that the Student's-t Test distribution is attainable for this sample size. The results of the contrast are detailed as follows:

- With respect to the general teleoconch size, a less ***Teleoconch Length*** **(L)** of *C. amphiatlanticum* in relation with *C. comptum* is significant.
- Respecting to the ***Relative Last Whorl Length*** **(L_{LW} / L)**, there is verified that *C. comptum amphiatlanticum* possesses a major significant value that *C. comptum*.
- With respect to the ***Relative Teleoconch Wide*** **(W / L)**, *C. comptum amphiatlanticum* and *C. comptum*, does not present significant differences.
- With regard to the ***Aperture Widening*** **(A_W / A_L)**, *C. comptum amphiatlanticum* presents a very much minor widening that in *C. comptum*.
- Respecting to the ***Aperture Size*** **($\sqrt{AW \times AL}$ / L)**, we do not find significant difference between any of the two species.

3.3. Statistical Conclusions

Having present these statistical results, we can conclude that *C. comptum amphiatlanticum* has, in general, a minor size and a more compact and flattened spire. It presents also a narrower, elliptical and elongated aperture than *C. comptum*, occupying the last whorl 77 % of the total length of the shell. In turn, its aspect is more fusiform and with the least marked whorls.

4. COMPARATIVE DIAGNOSIS

As we already mentioned in the introduction, *C. comptum* is the species which can lead to some type of morphologic misidentify comparing it with the new described subspecies. Nonetheless, these have a series of characteristics that make it clearly distinguishable. Already in SPRINGSTEEN & LEOBRERA [19] and in BEU [2], were definite the differences between *C. comptum* and *C. vespaceum* clearly.

C. comptum amphiatlanticum has generally a minor size, narrower aperture and a shorter siphonal channel than *C. comptum*, as well as a more fusiform aspect and a lower spire. In turn, the color is much clearer, having a cream and yellow tonality. Also, the protoconch of *C. comptum amphiatlanticum* is lower, broad and thinner, of dull aspect and of minor transparency. The differences are appreciated even in the first larval whorl, being this lower and wider than in *C. comptum*. As for the ornamentation, *C. comptum amphiatlanticum* posses in the majority of the analyzed specimens, only a thinner secondary spiral cord, between every principal cord. These characteristics are unlike *C. comptum*, that presents even three spiral cords. Besides, the axial cords are more defined and separated than in *C. comptum*. They cause, in its intersection with the spiral cords, a few major granulations and also more definite and separated in *C. comptum amphiatlanticum*. Also, the protuberances or spiral nodules are less accused, forming less marked shoulders, though there is less space between them, and therefore, they are in a major number than in *C. comptum*. This characteristic is clearly observed from an apical position. Likewise, *C. comptum amphiatlanticum* has only one varix, thicker enough, unlike the thinner three as minimum of *C. comptum*. This varix is dorsally displeased, whereas the equivalent one in *C. comptum* is nearer from the columelar edge. Finally, the apertural teeth are thinner and closer in *C. comptum amphiatlanticum*, probably due to the narrower aperture that it has, having less space for its insertion. Besides, the peristoma is more folded, standing out less towards the exterior than in *C. comptum,* having it more widespread, starting to invade even lightly the external lip in this last species.

5. BIOGEOGRAPHICAL CONSIDERATIONS

Until a few years ago, *Cymatium vespaceum* (Lamarck, 1822) was appearing as one of the cosmopolitan species of tropical waters belonging to the family Ranellidae (=Cymatiidae). After the investigations of the last two decades, this species has been removed in new others, giving origin to what it is known as *"C. vespaceum Complex"* (BEU [2]). This complex includes at least 6 - 7 species: *C. vespaceum*, *C. comptum*, *C. indomelanicum*, *C. penniketi*, another new species that we will describe soon from Mozambique, and the new subespecies described here: *C. comptum amphiatlanticum*. Two of these (C. vespaceum and C. comptum) live in the western Pacific Ocean, three in the Indian ocean (*C. vespaceum*, *C. penniketi*, *C. indomelanicum*), whereas only one (*C. comptum amphiatlanticum*) lives in the Atlantic Ocean, (though *C.vespaceum* seems that it appears sporadically in this ocean (PIECH [13]). The restricted distribution of the species of this "complex", which live in the Indian Ocean, have us to think that the center of irradiation and the common ancestor of all of them was in some tropical region of the West Pacific Ocean. Probably, it began its dispersion towards the Indian and the Atlantic Ocean in the Pliocene, with successive connections and desconnections of genetic flow caused by the alternates climatic changes. This happened fundamentally during the Quaternary, when the deflections of the paths of the marine cold and hot streams played an important role in the phenomena of dispersion, genetic flow and speciation of many of the current species.

In the case of *C. comptum amphiatlanticum*, we think that the ancestral form penetrated in the system of Atlantic Ocean circulation during some interglaciar epoch of the Lowest Pleistocene, across Agulhas's stream in South Africa, in which the Benguela's cold stream moderated and allowed its introduction.

6. ACKNOWLEDGEMENTS

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7. ILLUSTRATIONS

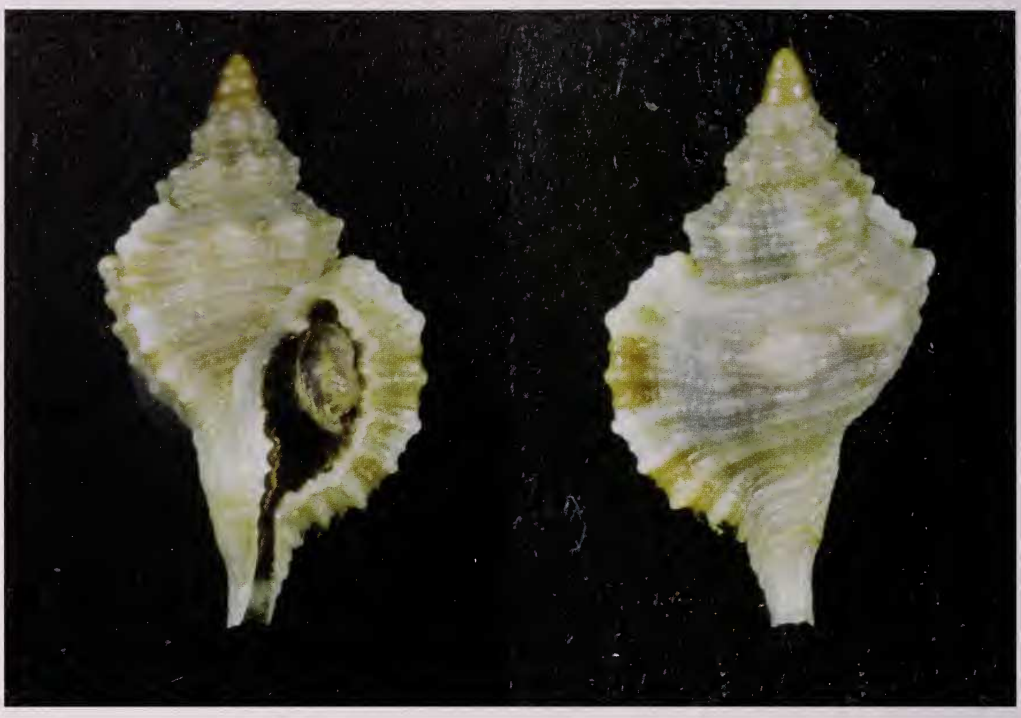

Fig. 1: Holotype of *Cymatium (Monoplex) comptum amphiatlanticum* n. ssp. Ventral and Dorsal view.

Fig. 2: Comparison between *C. comptum amphiatlanticum* and *C. comptum* protoconchs. Note the differences between whorls morphology.

Fig. 3: From left to right side, Paratypes 6 and 7 and Holotype of *Cymatium (Monoplex) comptum amphiatlanticum* n. ssp. (first row), comparing with three small specimens of the Indo - West Pacific typical form of *C. comptun*, (second row).

Fig. 4: Paratypes of *Cymatium (Monoplex) comptum amphiatlanticum* n. ssp

Fig. 5: Comparison between specimens of similar length of some species of the *"Cymatium vespaceum Complex"*. From left to right: n. sp. from MOZAMBIQUE; *C. comptum*, from PHILIPPINES; *C. comptum amphiatlanticum*, from FLORIDA; *C. vespaceum* and Holotype of *C. indomelanicum*, both from MOZAMBIQUE. Note the differences between whorls, spire, aperture and siphonal channel of each specimen.

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